10/12/17

"The biggest human temptation is to settle for too little" -Thomas Merton

HW: "2017 Calc Q1T2 Review" finish

Test 2 on Monday 10/16

AIM: What is the Product Rule?

Warm Up:

Differentiate (find the derivative) the following:

f(x)= (x+2)(x-3)

$f(x) = x^2 - 1x - 6$

$f'(x) = 2x - 1$

Product and Quotient Rules

If a function contains two variable expressions multiplied together, you can't simply find the derivative of each and multiply the results.

$$y = (3x^2 - 5x)(x^4 + 3x^2 - 9x + 1)$$

1. The Product Rule:

If a function is the product of two differentiable functions then the derivative is "the first times the derivative of the second plus the second times the derivative of the first."

$$\frac{d}{dx}\left[f(x) \bullet g(x)\right] = f(x)g'(x) + g(x)f'(x)$$

Shorthand

$$h = f \bullet g$$

$$h' = f \bullet g' + g \bullet f'$$

EX #1: Find the derivative of $f(x)$

$f'(x) = g \cdot h' + h \cdot g'$

$$f(x) = \underbrace{(2x-1)}_{g}\underbrace{(x-4)}_{h}$$

$f'(x) = (2x-1)(1) + (x-4)(2)$

$= 2x - 1 + 2x - 8$

$= 4x - 9$

$f(x) = 2x^2 - 8x - 1x + 4$

$f(x) = 2x^2 - 9x + 4$

$f'(x) = 4x - 9$

EX #2: Differentiate

$$y = \underbrace{(x^2+3x-1)}_{f}\underbrace{(2x^2-5)}_{g}$$

$$y' = f \cdot g' + g \cdot f'$$

$y' = (x^2+3x-1)(4x) + (2x^2-5)(2x+3)$

$y' = 4x^3 + 12x^2 - 4x + 4x^3 + 6x^2 - 10x - 15$

$y' = 8x^3 + 18x^2 - 14x - 15$

DO Now:

$g(x) = (\sin x)(4\sqrt{x})$

f h

$g'(x) = f \cdot h' + h \cdot f'$

$g(x) = (\sin x)(4x^{1/2})$

$g'(x) = (\sin x)(2x^{-1/2}) + (4\sqrt{x})(\cos x)$

$= (\sin x)\left(\frac{2}{\sqrt{x}}\right) + (4\sqrt{x})(\cos x)$